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Pesticide Exposure and Related Illness
A Report on Existing Baseline Data in Region 10

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16. Abstract (Limit: 200 words) 4101 - Pesticide Exposure and Related Illness: A Report on Existing Baseline Data in Region 10 The report is part of National Network for Environmental Management Studies under the auspices of the Office of Cooperative Environmental Management of the U.S. Environmental Protection Agency. EPA Region 10's efforts to assess existing baseline exposure and related illness data in the State of Washington uncovered a lack of any pesticide-related tracking system at rural hospitals or farm workers' clinics in the State. The main source of occupational exposure data in Washington came from worker compensation claims. Worker compensation summary reports (1985 to 1988) provided information on activity, illness, industry, location, number of recommended days off, pesticides involved, verification, and date of exposure. Tables were made to summarize occupational illnesses by (1) industry and work activity, (2) agricultural production by work activity, (3) incidental occupational illness by industry, (4) illness due to spray activity, and (5) illness by crop work activity. As for non-occupationally related exposures, the data came solely from voluntary calls to the Washington Poison Control Centers. This data does not identify the specific pesticide responsible or confirm the callers' claim. A Washington State Law effective January 1, 1990, requiring mandatory pesticide illness reporting is expected to dramatically increase the number of pesticide illness cases reported similar to increases witness after the State of Oregon passed a mandatory reporting law.			
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A Report on Existing Baseline Data
in Region 10

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EXECUTIVE SUMMARY

EPA Region 10's efforts to assess existing baseline exposure and related illness data in the State of Washington proved to be a difficult task. Initial efforts uncovered a lack of any pesticide related tracking system at rural hospitals or farm workers' clinics in the State.

The main source of occupational exposure data in Washington came from worker compensation claims filed with the Washington Department of Labor and Industry. Worker compensation summary reports from the years 1985 to 1988 were scanned for claims associated with pesticides. The claim files for claims associated with pesticides were requested from the Washington Department of Labor and Industry and were reviewed. Information on activity, illness, industry, location, number of recommended days off, pesticides involved, verification, and date of exposure were collected. Tables were made to summarize occupational illnesses by (1) industry and work activity, (2) occupational illness associated with agricultural production by work activity, (3) incidental occupational illness by industry, (4) occupational illness due to spray activity, and (5) occupational illness by crop work activity.

As for non-occupationally related exposures, the only statistics available were those from the Washington Poison Control Centers. Since all calls to Poison Control Centers are voluntary and, at present, there is no process to confirm a poisoning or identify the specific pesticide responsible, we were unable to gather the same categories of information that we collected for our survey of Workers' Compensation claims.

The limited amount of substantiated data on pesticide exposures remains an impediment to EPA Region 10's attempt to refine overall risk assessments, target training programs, strengthen compliance programs, and develop risk reduction initiatives.

In Region 10, only the State of Oregon has thus far instituted a mandatory reporting program. However, on April 23, 1989, the Washington State Legislature passed a mandatory reporting law. This law becomes effective January 1, 1990. It is anticipated that a direct consequence of this law will be a large increase in the number of pesticide illness cases reported in the State of Washington. In the State of Oregon, which has had mandatory reporting since July of 1987, there has been a dramatic increase in the number of cases reported since reporting became mandatory.

The United States Environmental Protection Agency recently identified inadvertent exposure to pesticides as one of the greatest risks to human health posed by environmental contamination. This finding, in conjunction with ever increasing public concern over these health risks, has resulted in increased efforts and new initiatives by the EPA to mitigate the risks associated with exposure to pesticides via current and future decision-making and planning.

In Region 10, which includes Alaska, Idaho, Oregon, and Washington, pesticides were ranked in the highest category of human health risks under the Comparative Risk Project (CRP), a project designed to compare a wide range of environmental problems in terms of the risks they pose to human health and the environment. As a result, a Risk Management Strategy for Pesticides was developed to help mitigate the risks associated with pesticide exposure. The strategy is composed of four major components: educating and training farm workers; coordinating pesticide programs across levels of government and environmental media; augmenting state pesticide use inspection and compliance programs; and gathering data on actual pesticide exposures and the effects thereof. Initially focusing on the state of Washington, the strategy plans to incorporate the remaining states in the region over the next 2-3 years. This report represents the fourth component of the Risk Management Strategy for Pesticides in Region 10--the collection of data regarding actual pesticide exposure and related illness in Washington.

Data, or the lack of it, regarding actual exposures and contamination incidents, has been a major impediment to the development of pesticide programming for the mitigation of risks. More quantitative information is needed to refine overall risks and provide a solid base for strengthening compliance programs, developing legislative initiatives where appropriate, and targeting training needs and outreach programs. Improving the Agency's data base in this area is the goal of this report.

DATA COLLECTION

Originally, it was assumed that rural clinics and hospitals would be the best resources for information on pesticide related illness. However, numerous complications arose during our data search making it impossible for us to utilize these resources. Consequently, we had to investigate possible new sources, a process that proved to be extremely time consuming.

In response to our initial contact letter soliciting clinics' assistance with this project, most clinics indicated that they were willing to cooperate. Our ability to access data on pesticide exposure proved to be infeasible, however, for various reasons. First, out of fifteen clinics and hospitals originally contacted, only one had a flagging system that identified and tabulated the data into a separate file. The data from this source proved to be inadequate, however, as the flagging system has only been operational since March 1, 1989. The rest of the clinics did not have any method at all of identifying pesticide-related illness cases; thus, the only method of obtaining these files was to

examine each clinic's entire file system one by one. With some clinics averaging 75,000 visits per year, this method was too time consuming to be a viable option for this project. It was then discovered that a file screening by primary diagnoses could be done via computer. This, it was thought, could help reduce to a manageable amount, the number of files to be examined. Which primary diagnoses to key into the computer, however, proved to be a very difficult decision. In Recognition and Management of Pesticide Poisonings, the fourth edition of a series designed "to provide health professionals with recently available information on the health hazards of pesticides currently in use", there are over 100 "symptoms and signs of poisoning" resulting from exposures to various pesticides. Linking these symptoms and signs to primary diagnoses for the purpose of a computer search is not an easy task. Many are simply non-specific symptoms for which no primary diagnosis exists. Headache and nausea, for example, are two symptoms which often result from exposure to pesticides. Neither of these symptoms alone or together indicate a specific primary diagnosis. In these instances doctors will often write "exposure to pesticides" or "organophosphate pesticide poisoning" in place of a primary diagnosis. As a result, these files cannot be searched for by the computer.

In addition, those primary diagnosis that do result from pesticide exposure are often very similar to those that would result from an allergy. Dermatitis and urticaria, for example, are two common illnesses of pesticide exposure; they are also very common illnesses due to allergies. Thus, by screening for dermatitis or urticaria, numerous extraneous files relating to allergies and not pesticides would be identified for examination. Even so, this method would at least reduce the number of files to be examined as compared to the first method which required an examination of each and every file.

Although this method appeared to be preferable to the first, our inability to screen and identify files via symptoms rather than primary diagnoses forced us to abandon this method as well.

Even if this identification method could have been perfected or some other way of identifying pesticide-related files could have been developed, the issue of confidentiality would have caused still further complications in the collection process. As in any doctor/patient situation, the clinics we contacted have assured their patients that any information contained in their files will remain confidential. Since many of the incidents involved temporary residents, obtaining a release from many of the patients was not possible. Without these releases, our data survey would have been a breach of these clinics' promises to their patients, regardless of our assurances that only the data and not the names were of interest to us. Thus, in order for us to be able to collect data from a file, the name of the patient would somehow have to have been obscured from our view prior to our survey. One way to meet this requirement would have been to first have the names blocked out and then the files photocopied for our examination. Although the clinics were willing to cooperate with us in our data collection, understandably, most simply could not afford to commit their already strained resources to such a time-consuming task.

At this point, it was obvious to us that clinics and hospitals, as a data source, would be too difficult for us to access. As a result, we needed to find new sources -- sources that not only could flag and tabulate pesticide-related cases in some format, but also could assist us in our survey in order to eliminate the confidentiality problem. We contacted the Washington Department of Social and Health Services, the Washington Department of Labor and Industries, and the Washington Poison Control Centers. Since the Department of Social and Health Services and the Poison Control Centers handle mainly household calls concerning minor exposures, we decided that the Department of Labor and Industries, where claims of occupational injuries are made for workers' compensation, would be our best and most consistent source of information.

We discovered that the Department of Labor and Industries could generate computer printouts listing all of the claims potentially related to pesticides on a quarterly or yearly basis. By scanning the "source of injury" column for specified Standard Industrial Code (SIC) numbers, one can identify those claims that are based on injuries or illnesses due to pesticides.

Once a claim has been identified from the printout, requests for a copy of the file on microfiche can be made to the Department of Labor and Industries. This, it seemed, would at least solve our data identification problems; the only remaining problem was how to deal with the issue of confidentiality. As a fellow government agency, Labor and Industry gave us full permission to examine the files with the names intact as long as we adhered to their confidentiality requirements. Such requirements included the safe keeping of the files during the survey and the destruction of the files upon completion of the survey.

Our main source of data thus became workers' compensation claims filed with the Department of Labor and Industry. We requested quarterly reports back to 1985, scanned them for claims associated with pesticides, and then requested copies of the files on microfiche. Information on activity, illness, industry, location, number of doctor recommended days off, pesticide involved, verification, and date of exposure, was collected and entered into a database.

The two SIC numbers that cover most of the pesticide claims are 978 and 979. SIC 978 is defined as "insecticide, organophosphate (Malathion, Diazinon, Systox)", whereas SIC 979 is defined as "insecticide, fungicide, fumigant, weed killer, herbicide, NEC." Claims coded under these numbers do not necessarily include the actual name of the pesticide. In fact, in approximately 50% of the cases the name of the pesticide is unknown.

Pesticide claims can also appear under other numbers as well. SIC numbers 900, 999, and 9800 are three rather unspecific numbers under which pesticide-related claims may also be coded. SIC 900 is defined as "chemicals, chemical compounds (type not stated)"; SIC 999 is defined as "chemicals, chemical compounds, NEC (includes soaps, detergents and cleaning compounds)"; and SIC 9800 is defined as "unknown, unidentified (other than particles)." Some pesticide-related claims will appear under these numbers due to the coder's unfamiliarity with some pesticide names or inadequate data at the

time of the coding. Thus, in order to compile a complete record of all pesticide-related claims, one would have to scan for all five codes -- a process that would require a large number of cases to be examined and yet locate only a small number of pesticide-related cases.

One way to minimize the number of cases that result from this process is to check the employer's name and industry code once a 900, 999 or 9800 is discovered. By reading the employer's name, one can usually get a good idea of whether or not the case is pesticide-related. "Jones' Farms" or "Jackson's Fruit Orchard" for example, would indicate agricultural production -- an activity associated with pesticide use and therefore likely to have associated pesticide related claims. A claim filed under this employer would therefore be selected for examination. An employer's name such as "Jim's Pizza", on the other hand, would lead one to believe that more likely than not, the case involved a non-pesticidal product (a cleaning compound for instance), and could therefore be ignored. If the name does not seem to indicate what type of industry is involved in the claim, the industry code can be a helpful tool in much the same way. The numbers 01 and 07 for example, represent "Agricultural Production -- Crops" and "Agricultural Services" respectively -- again, two industries where one would expect to find a number of pesticide-related claims. Thus, while "Joe Johnson" appearing as an employer may not indicate a farm, an industry code number of 01 defined as "Agricultural Production -- Crops", would. In this way, some of the extraneous files likely to occur in the non-agricultural industries could be eliminated -- saving both time and resources.

However, by eliminating other 900, 999 and 9800 claims from inspection in this way, the data becomes skewed toward industries like agricultural production while many pesticide exposure incidents in other industries go unchecked. At first, one may assume that few pesticide-related incidents occur outside of the agricultural industry and thus these omissions are somewhat insignificant. Additionally, it may be assumed that those incidents that do occur in non-agriculturally-related industries are most often due to incidental exposure to third parties spraying for insects or weeds and that these omissions also are insignificant. However, what is often forgotten while making these assumptions, is that many industries such as Business Services or Hotels/Lodging Places often hire full time ground keepers or landscapers. These workers have just as much potential for being exposed to pesticides as do laborers who work in the 07 category -- "Agricultural Services". Also, the incidental exposures should not be omitted just because they are incidental. Rather, they should be included in the survey as a monitoring device for measuring how well structural sprayers are doing with regards to ensuring the safety of those who may come into contact with their applications.

Our first preference of course, was to examine all of the possible pesticide-related cases. In other words, every 900, 999 and 9800 would be examined in addition to the 978's and 979's. However, shortly after we began the scanning process, we realized that the number of cases identified was simply overwhelming. Not only were our resources insufficient to examine such a large number of files in such a short period of time, but also the Department of Labor and Industries' resources were insufficient to process such a large number of requests for information in such a short period of time.

In order to use our resources as judiciously as possible given the time constraints placed on this project, we began examining only the 978 and 979 claims with the idea that the 900, 999 and 9800 data could be collected and added at a later date if time allowed. This method, in order to be consistent, assumed that approximately the same number of pesticide cases are miscoded under 900, 999 and 9800 each year. We believe that analysis of the 978 and 979 cases would be a sufficient method for examining trends and overall numbers, keeping in mind that they underestimate the true total by about 30%.

The actual data collected from the 978 and 979 files includes activity, date of exposure, illness, industry, location, number of recommended days off, and pesticide involved. In determining which cases to include in our database, we selected only those for which the doctor's response to the question "Did condition diagnosed result from this injury/illness?" was "Yes" or "Probable". These two responses are used by the Department of Labor and Industries in accepting occupational claims. The following tables represent the data collected based on these two responses. Where dates are not specified, the data represents a total for the years 1985-1988.

In the tables that follow, the industry categories are assigned to each claim by the Department of Labor and Industries based on the business activity of the claimant's employer. The work activity categories are those reported by the claimant as their job title at the time of the incident. When the word "incidental" appears under work activity, this indicates that the claimant's exposure was not related to their occupation in any way. As an example, a secretary in the Health Services industry may have been exposed to the fumes of a structural spray application. In this case, his/her exposure was "incidental". If a work activity is followed by "--spraying", this indicates that the claimant was spraying at the time of his/her exposure and that the act of spraying is not a routine activity associated with the claimant's occupation. If spraying is a routine activity for the claimant, then the designated work activity category is "applicator".

Table 1 contains all of the cases surveyed for this report. It gives the number of illnesses of each type by industry and work activity. Table 2 contains only those cases that are related to agricultural production by work activity. Many of the work activities found in this table are not found under the "Agricultural Prod. -- Crops" industry in Table 1 as would be expected. Rather, they are found in industries such as "Agricultural Services" as "mixers/loaders, aerial" or "Wholesale Non-Durable" as "sorters" for fruit packing and warehousing companies. Table 3 contains those incidents that were the result of incidental exposure. Since the claimant's work activity is irrelevant to the exposure, only the industry category is included. Table 4 contains all of the incidents that involved a claimant spraying at the time of his/her exposure. This includes applicators as well as those who were involved in non-routine (designated as "--spraying") applications. Finally, Table 5 shows occupational illness by target and work activity.

Table 1

Occupational Illness by Industry & Work Activity

Industry	Work Activity	Eye	Skin	Systemic	Eye/Skin	Systemic/Eye	Systemic/Skin
Admin. of Econ. Programs	Applicator		1				
Admin. of Econ. Programs	Mechanic - Spray Equip.						1
Admin. of Econ. Programs	Mixer/Loader			1			
Agric. Prod. - Crops	Applicator	2	14	23	3	2	5
Agric. Prod. - Crops	Blossom Clipper				1		
Agric. Prod. - Crops	Irrigation Mgr. - Spraying		1				
Agric. Prod. - Crops	Limb Tier			1	1		
Agric. Prod. - Crops	Mechanic - Spray Equip.			3			
Agric. Prod. - Crops	Mixer/Loader, Aerial		1				
Agric. Prod. - Crops	Mixer/Loader, Ground	1		2			
Agric. Prod. - Crops	Packer		1	1			
Agric. Prod. - Crops	Picker		15	7	1		1
Agric. Prod. - Crops	Sorter		2	3			
Agric. Prod. - Crops	Thinner	1	9	5			1
Agric. Prod. - Livestock	Applicator			1			
Agric. Services	Applicator	1		3			1
Agric. Services	Groundskeeper			1			
Agric. Services	Landscaper		1				
Agric. Services	Landscaper - Spraying	1					1
Agric. Services	Packer		1				
Agric. Services	Mixer/Loader, Aerial			3			
Agric. Services	Mixer/Loader, Ground			3			1
Agric. Services	Seed Mill Laborer						1
Agric. Services	Vet Asst. - Flea Dipping			1			
Bldg. & Garden Supplies	Applicator		1				
Bldg. & Garden Supplies	Greenhouse Laborer		1				
Bldg. & Garden Supplies	Incidental			1			
Business Services	Incidental			1			
Business Services	Pest Control Sprayer		2				
Eating & Drinking Places	Incidental		1	1			
Educational Services	Applicator						1
Educational Services	Incidental			6			
Environ. Qual. & Housing	Incidental						1
Environ. Qual. & Housing	Mixer/Loader			1			
Exec., Legis., & General	Landscaper			1			
Exec., Legis., & General	Maintenance Worker - Spraying				1		
Food & Kindred Products	Incidental			1			
Food Stores	Incidental						1
Forestry	Tree Thinner			1			
General Bldg. Contractors	Applicator			1			
General Bldg. Contractors	Incidental			1			
Health Services	Incidental			6			1

Table 1 (Cont.)

Industry	Work Activity	Eye	Skin	Systemic	Eye/Skin	Systemic/Eye	Systemic/Skin
Heavy Constr. Contractors	Groundskeeper - Spraying			1			
Heavy Constr. Contractors	Landscaper - Spraying			1			
Hotels/Lodging Places	Groundskeeper			1			
Hotels/Lodging Places	Incidental	1			1		
Hotels/Lodging Places	Landscaper			1			
Hotels/Lodging Places	Landscaper - Spraying	1					
Justice, Order & Safety	Maintenance Worker - Spraying		1				
Lumber & Wood Products	Incidental					1	
Membership Organizations	Pastor - Spraying			1			
Misc. Manf. Industries	Incidental			1			
Misc. Retail	Applicator		1				
Misc. Retail	Incidental		2				
Misc. Retail	Greenhouse Laborer		1				
Misc. Retail	Greenhouse Laborer - Spraying			1			
Paper & Allied Products	Incidental				1		
Primary Metal Industries	Incidental		1				
Real Estate	Groundskeeper - Spraying			1			
Real Estate	Hotel Mgr. - Spraying			1			
Real Estate	Housing Mgr. - Spraying			1		1	
Real Estate	Incidental					1	
Real Estate	Maintenance Worker - Spraying		1	1			
Social Services	Landscaper			1			
Social Services	Mechanic - Spray Equip.			1			
Special Trade Contractors	Incidental			1			
Trucking & Warehousing	Incidental			4			
Trucking & Warehousing	Laborer - Spraying			1			
Wholesale Durable Goods	Incidental			2			
Wholesale Non-Durable	Applicator			2			
Wholesale Non-Durable	Dipping Machine Operator		1				
Wholesale Non-Durable	Fertilizer Prod. Worker			1			
Wholesale Non-Durable	Greenhouse Laborer			1			
Wholesale Non-Durable	Incidental			1			
Wholesale Non-Durable	Mechanic - Spray Equip.			1			
Wholesale Non-Durable	Packer		6	2			
Wholesale Non-Durable	Sorter		4	6			
Wholesale Non-Durable	Warehouse Laborer - Spraying			1			

Total Number of Occupational Exposures 223

Table 2

Occupational Illness Associated with Agricultural Production by Work Activity

<u>Work Activity</u>	<u>Eye</u>	<u>Skin</u>	<u>Systemic</u>	<u>Eye/Skin</u>	<u>Systemic/Eye</u>	<u>Systemic/Skin</u>
Applicator	3	14	29	3	2	6
Blossom Clipper					1	
Dipping Machine Operator		1				
Fertilizer Prod. Worker			1			
Greenhouse Laborer		1				
Irrig. Mgr. - Spraying		1				
Limb Tier			1	1		
Mechanic - Spray Equip.			4			
Mixer/Loader, Aerial		1	3			
Mixer/Loader, Ground	1		5			
Packer		8	3			
Picker		15	7			
Seed Mill Laborer						1
Sorter		6	9			
Thinner	1	9	5			1

Total Number of Occupational Exposures Associated with Agricultural Production 143

Table 3

Incidental Occupational Illness by Industry

<u>Industry</u>	<u>Eye</u>	<u>Skin</u>	<u>Systemic</u>	<u>Eye/Skin</u>	<u>Systemic/Eye</u>	<u>Systemic/Skin</u>
Bldg. & Garden Supplies			1			
Business Services			1			
Eating & Drinking Places		1	1			
Educational Services			6			
Food & Kindred Products			1			
Food Stores					1	
General Bldg. Contractors			1			
Health Services			6			
Hotels/Lodging Places		1				
Lumber & Wood Products					1	
Misc. Retail		2				
Paper & Allied Products				1		
Primary Metal Industries		1				
Real Estate					1	
Special Trade Contractors			1			
Wholesale - Durable			2			
Wholesale Non-Durable			1			

Total Number of Incidental Occupational Exposures 30

Table 4

Occupational Illness due to Spray Activity

<u>Industry</u>	<u>Work Activity</u>	<u>Eye</u>	<u>Skin</u>	<u>Systemic</u>	<u>Eye/Skin</u>	<u>Systemic/Eye</u>	<u>Systemic/Skin</u>
Admin. of Econ. Programs	Applicator			1			
Agric. Prod. - Crops	Applicator	2	14	23	3	2	5
Agric. Prod. - Crops	Irrigation Mgr. - Spraying		1				
Agric. Services	Applicator	1		3			1
Bldg. & Garden Supplies	Applicator		1				
Business Services	Pest Control Sprayer		2				
Educational Services	Applicator					1	
Exec., Legis., & General	Maintenance Worker - Spraying			1			
General Bldg. Contractors	Applicator			1			
Heavy Constr. Contractors	Groundskeeper - Spraying			1			
Heavy Constr. Contractors	Landscaper - Spraying			1			
Hotels/Lodging Places	Landscaper - Spraying		1				
Justice, Order & Safety	Maintenance - Spraying		1				
Membership Organizations	Pastor - Spraying			1			
Misc. Retail	Greenhouse Labor - Spraying			1			
Real Estate	Groundskeeper - Spraying			1			
Real Estate	Hotel Mgr. - Spraying			1			
Real Estate	Housing Mgr. - Spraying			1			1
Real Estate	Maintenance - Spraying		1	1			
Trucking & Warehousing	Laborer - Spraying			1			
Wholesale Non-Durable	Applicator			2			
Incidental			5	22	1	3	

Total Number of Occupational Exposures due to Spray Activity 99

Table 5

Occupational Illness by Site & Work Activity

<u>Crop</u>	<u>Work Activity</u>	<u>Eye</u>	<u>Skin</u>	<u>Systemic</u>	<u>Eye/Skin</u>	<u>Systemic/Eye</u>	<u>Systemic/Skin</u>
Animals	Vet Asst. - Flea Dipping			1			
Apples	Applicator	1	1	3			1
	Blossom Clipper				1		
	Limb Tier		1	1			
	Picker		6	1			
	Sorter		2	9			
	Thinner		5	4			
Asparagus	Picker		1	1			
Beans	Applicator		1	1			
Carrots	Applicator		1				
Cherries	Applicator			1	1		
	Picker		3				
Grapes	Applicator						1
	Mechanic - Spray Equip.			1			
	Picker					1	
Greenhouse Plants	Applicator		3	1			
	Greenhouse Laborer		2	1			
Hops	Applicator			2			
	Mechanic - Spray Equipment			1			
Non-Crop Insect Control	Hotel Mgr. - Spraying			1			
	Housing Mgr. - Spraying						1
	Pastor - Spraying			1			
	Pest Control Applicator		1	1			
Peaches	Applicator			1			
	Thinner	1					
Pears	Applicator		1				
	Dipping Machine Operator		1				
	Packer		6				
	Picker		3	1			
	Sorter		3				
Seeds	Seed Mill Operator					1	
Sod	Applicator			1			
Soil Preparation	Applicator		1				
Trees	Thinner			1			
Non-Crop Weed Control	Applicator	1			2	1	1
	Groundskeeper			2			
	Groundskeeper - Spraying			2			
	Irrigation Mgr. - Spraying		1				
	Landscaper		1	3			
	Landscaper - Spraying	1		1			1
	Maintenance Worker - Spraying		2	1			

It is important to remember that Tables 1-5 represent only those incidents that are both occupationally related and subsequently reported to the Department of Labor and Industry via worker's compensation claims. In the case of farm workers, it is believed that a large number of pesticide exposures do indeed occur each year, but nonetheless, go unreported. According to a 1988 study of 460 farm workers done by Michele Mentzer, J.D. and Villalba R.N., M.N., entitled "Pesticide Exposure and Health: A study of Washington farm workers", only 8-15% of those who felt ill effects due to pesticides ever sought medical attention. As a result, they believe that "the low number of farm workers who seek medical attention when they feel ill from chemical exposure indicates that workers compensation statistics may greatly understate the impact that pesticide exposure has on farm worker health."

Mentzer and Villalba propose a number of theories as to why so few farm workers actually seek medical attention:

- (1) Farm workers whose employment is intermittent and whose income is low may not feel able to take time off from work to seek medical attention.
- (2) Some are unaware that their medical bills would be covered by workers compensation, believing instead that they would have to pay the cost of medical care themselves.
- (3) Farm workers may fear employer disapproval if it is found out they reported their illness as caused by an unsafe practice on the farm.
- (4) The symptoms of pesticide poisoning resemble symptoms of a cold, flu, gastroenteritis or heat stroke, and so farm workers (as well as physicians) are often unaware that they are dealing with chemical intoxication. Such reactions to pesticides may appear non-serious and transitory, not necessitating medical care.
- (5) Most farm workers are not aware of the possible long-term health consequences of their continued exposure to pesticides. The occasional rashes, blurred vision, yellow fingers or sore throat that they experience may be accepted as simply some of the many difficulties of the life of a migrant farm worker" (p.42).

As for non-occupationally related exposures, the only statistics available are those from the Washington Poison Control Centers that appear in Tables 6-8. Most of these types of incidents occur in and around the home. Some exposures result in doctor's visits; however, without mandatory reporting, there is little incentive to inform health officials of these non-occupationally related exposures. As a result, there is very little data available on non-occupationally related incidents from physicians' reports.

Other exposures result in calls to one of the Washington Poison Control Centers. The Poison Control Centers provide immediate service to the public and to the medical profession by advising on the recognition and treatment of poisoning. Since all calls to Poison Control Centers are voluntary and, at present, there is no process to confirm a poisoning or to identify the specific pesticide responsible, we were unable to gather the same categories of information that we collected from our survey of worker's compensation claims. However, the Poison Control Center does generate annual reports that categorize their calls into classes and sub-classes. As a result, it was possible to gather data on the number of human exposure calls made involving Herbicides, Insecticides and Rodenticides. Upon careful examination, these numbers could provide the Agency with a brief overview of the problem and could possibly be used to target certain types of pesticides for public outreach programs.

Table 6

Washington Poison Control Center Network

Data Report -- 1986

Pesticide Summary -- Call Types

Class:	Human Exposures
Subclass:	
I. Herbicides 402	
Carbamate Type	4
2,4-D or 2,4,5-T	158
Paraquat	18
Paraquat/Diquat Combinations	1
Triazine Type	50
Urea Type	6
Other Types	156
Unknown Types	9
II. Rodenticides	339
1080/Monofluoroacetate/SMFA	2
Anticoagulants Warfarin Type	218
Long-Acting Anticoagulant Type	97
Strychnine Type	14
Vacor/PNU	1
Other Types	2
Unknown Types	5
III. Insecticides 2,050	
Arsenicals	1
Borate Types	29
Carbamate Types (Alone)	179
Carbamate Combinations	22
Chlorinated Hydrocarbons (Alone)	294
Chlorinated Hydrocarbon Combinations	6
Metalddehyde	68
Nicotine Type	8
Organophosphate Type (Alone)	582
OP and Carbamate Combinations	128
OP and Chlorinated Hydrocarbons	23
OP and Other Type Combinations	21
OP and Carbamate and Chlorinate HC	3
Piperonyl Butoxide (Alone)	16
P.B. and Pyrethrin Combinations	182
Pyrethrins (Alone)	131
Insect Repellants	129
Rotenone	17
Veterinary Products	92
Other Types	30
Unknown Types	89
Total Number of Human Pesticide Exposures 1986	2,791

Table 7

Washington Poison Control Center Network

Data Report -- 1987

Pesticide Summary -- Call Types

Class:	Subclass:	Human Exposures
I.	Herbicides 471	
	Carbamate Type	3
	2,4-D or 2,4,5-T	184
	Diquat	6
	Paraquat	12
	Triazine Type	52
	Urea Type	2
	Other Types	203
	Unknown Types	9
II.	Rodenticides	349
	1080/Monofluoroacetate/SMFA	0
	ANTU	1
	Anticouglants Warfarin Type	152
	Long-Acting Anticouglant Type	167
	Strychnine Type	8
	Vacor/PNU	1
	Other Types	14
	Unknown Types	6
III.	Insecticides 2,100	
	Arsenicals	7
	Borate Types	10
	Carbamate Types (Alone)	129
	Carbamate Combinations	19
	Chlorinated Hydrocarbons (Alone)	252
	Chlorinated Hydrocarbon Combinations	10
	Metalddehyde	64
	Nicotine Type	4
	Organophosphate Type (Alone)	639
	OP and Carbamate Combinations	115
	OP and Chlorinated Hydrocarbons	22
	OP and Other Type Combinations	48
	OP and Carbamate and Chlorinate HC	4
	Piperonyl Butoxide (Alone)	23
	P.B. and Pyrethrin Combinations	232
	Pyrethrins (Alone)	127
	Insect Repellants	84
	Rotenone	12
	Veterinary Products	211
	Other Types	42
	Unknown Types	2,100
Total Number of Human Pesticide Exposures 1987		2,920

Table 8

Washington Poison Control Center Network

Data Report -- 1988

Pesticide Summary -- Call Types

Class:	Human Exposures
Subclass:	
I. Herbicides 439	
Carbamate Type	3
2,4-D or 2,4,5-T	167
Diquat	2
Paraquat	10
Triazine Type	37
Urea Type	12
Other Types	199
Unknown Types	9
II. Rodenticides	346
1080/Monofluoroacetate/SMFA	0
ANTU0	
Anticouglants Warfarin Type	128
Long-Acting Anticouglant Type	177
Strychnine Type	19
Vacor/PNU	0
Other Types	12
Unknown Types	10
III. Insecticides 2,173	
Arsenicals	2
Borate Types	15
Carbamate Types (Alone)	140
Carbamate Combinations	17
Chlorinated Hydrocarbons (Alone)	228
Chlorinated Hydrocarbon Combinations	11
Metaldehyde	44
Nicotine Type	6
Organophosphate Type (Alone)	653
OP and Carbamate Combinations	105
OP and Chlorinated Hydrocarbons	15
OP and Other Type Combinations	52
OP and Carbamate and Chlorinate HC	2
Piperonyl Butoxide (Alone)	6
P.B. and Pyrethrin Combinations	242
Pyrethrins (Alone)	139
Insect Repellants	130
Rotenone	16
Veterinary Products	222
Other Types	70
Unknown Types	58
Total Number of Human Pesticide Exposures 1988	2,958

As a result of this data survey, we concluded that, as long as the reporting of pesticide exposures is not mandatory, the lack of adequate data will continue to be a major impediment to any region's attempt to refine overall risk assessments, strengthen compliance programs, develop legislative initiatives, and target training needs.

As for Region 10, only the state of Oregon has thus far instituted a mandatory reporting program. However, on April 23, 1989, the Washington State Legislature passed a mandatory reporting law in response to "heightened concern regarding health and environmental impacts from pesticide use and misuse" which "has resulted in an increased demand for full-scale health investigations, assessment of resource damages, and health effects information."

Mandated to take effect January 1, 1990, the law is intended to "ensure adequate monitoring of pesticide use and protection of workers and the public from the effects of pesticide misuse." The act requires "any attending physician or other health care provider recognized as primarily responsible for the diagnosis and treatment of a patient, or, in the absence of a primary health care provider, the health care provider initiating diagnostic testing or therapy for a patient" to "report a case or suspected case of pesticide poisoning to the Department of Social and Health Services."

As a direct consequence of this legislative action, we anticipate a large increase in the number of cases reported in the state of Washington. In the state of Oregon, which has had mandatory reporting since July of 1987, there has been a dramatic increase in the number of cases reported to the Health Department. For the year prior to this mandatory reporting requirement, there were only 85 cases reported to the Health Department. 23 of these cases were occupational, 11 of which were referred by health care providers. The remaining 62 cases were non-occupational, 12 of which were referred by health care providers. From July 1, 1987, the date the law went into effect, until March 31, 1988, there were 16 occupational cases reported, 5 of which came from health care providers, and 29 non-occupational cases, 3 of which came from health care providers. At the end of this nine month period, the Health Department began instituting outreach programs and in the next four month period, from April 1, 1988 until July 31, 1988, there were 41 occupational cases reported, 35 of which came from health care providers, and 29 non-occupational cases reported, 15 of which came from health care providers. According to Margo Barnett of the Oregon Health Department, not only has the number of cases reported increased due to mandatory reporting, but also the quality of information has improved as well.

From these numbers it is obvious that a mandatory reporting law in conjunction with outreach programs can make a dramatic difference in the number of reported pesticide cases. Once the state of Washington institutes its reporting program it will be interesting to see how the data compares to that which was gathered for this report. With both Washington and Oregon's mandatory reporting programs in place, EPA Region 10 will hopefully be able to acquire an adequate database from which to design its programs and initiatives. However, until Idaho and

Alaska institute formal reporting systems of their own, the incomplete state database will continue to be an impediment to the Region's attempts to refine its programming, decision making, and risk assessments.